

Technical Abstracts

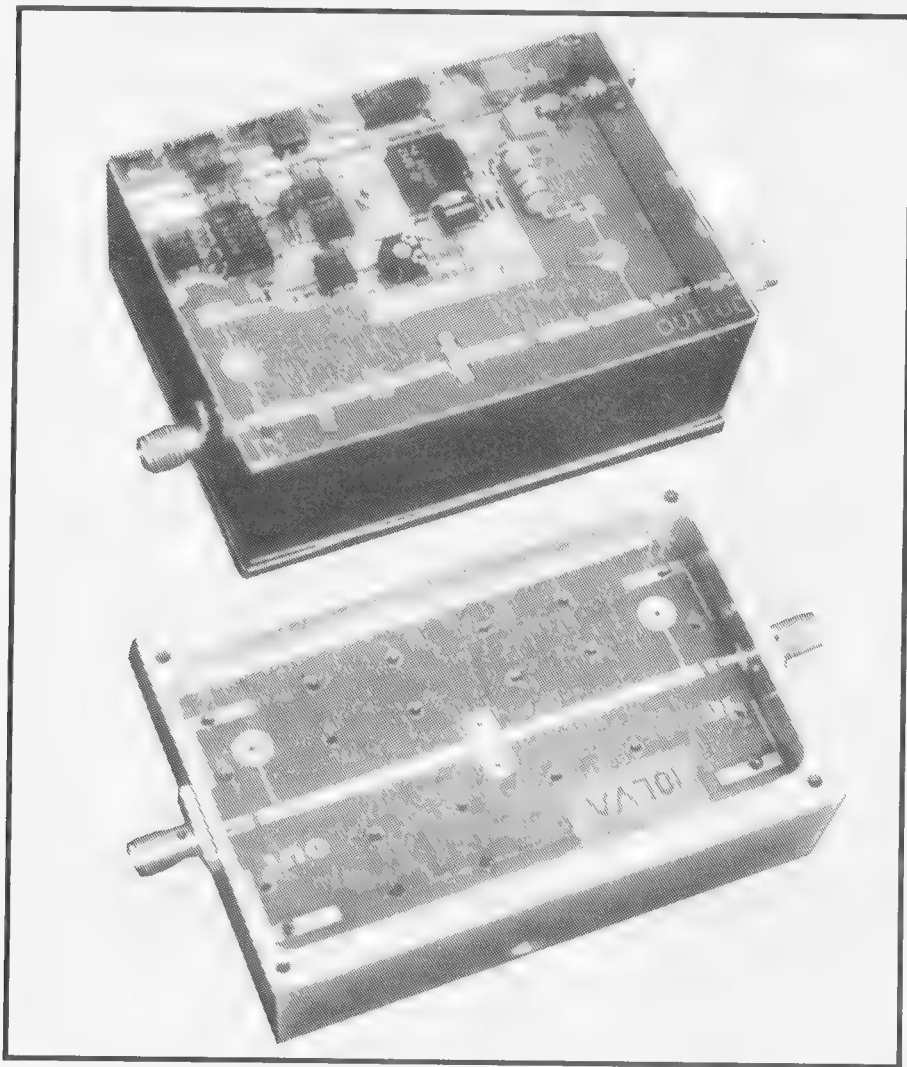
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A 1 Watt GaAsFet Linear Amplifier for 10 GHz

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The circuit as shown in Fig 1 is standard. It uses a printed circuit board of 0.79 mm Duroid 72 x 37 mm. This is a Teflon substrate. The measurements allow mounting in a standard size box of either tinplate or of silver plated aluminium. This gives

best results with regard to electrical and mechanical stability. One prototype was built on a larger board of 72 x 53 mm with success. This version is shown in the component layout in Fig 3.

The power supply components are

arranged on the same board. An LM317 is used for the 10 volt Drain voltage regulator. A 78L05 and an ICL7660 provide the negative Gate voltage. All components are surface mounted except the LM317. The component values shown provide exactly 10 volts and a negative voltage variable from 0.8 to 3.5 Volts. The BC337 transistor Q1 protects the drain voltage against loss of gate voltage and thus prevents any nasty surprises for the GaAsFet.

The component layout is shown in Fig 3 for the 72 x 53 mm PCB. Constructors capable of building this device should have no problem with the 72 x 37 mm PCB. The input and output capacitors are 1 pF ATC porcelain chips. The circuit board is trimmed to fit into the box. It is fixed to the bottom with 2 mm screws. Prepare the positions for the LM317 regulator and the MGF2430 GaAsFet. They are fitted through holes in the board direct onto the bottom of the box.

Drill the holes for the input and output connectors as required. Drill the hole for the 1000 pF feed through capacitor C1.

Drill 1.1 mm holes and thread them for 1.4 mm screws to fix the GaAsFet. Alternatively, drill 1.5 mm holes and use 1.5 mm brass screws. These screws are available from watchmaker's suppliers.

Now mount the circuit board with 2 mm screws at the bottom of the box, mount the SMA coax connectors, the feed through capacitor and the power supply components. At this stage make the first check that the voltages are correct.

Now the most delicate part of assembly begins with the mounting of the MGF2430. Ground the soldering iron to the box. (A wrist strap would be wise also. *Tech Ed.*) Mount the MGF2430 with screws as discussed previously. Quickly solder the Gate and Drain using a minimum of solder. At this stage the amplifier is completed and testing and tuning may commence.

First check again that all voltages are correct and that nothing has been overlooked. Make up 4 or 5 small tags

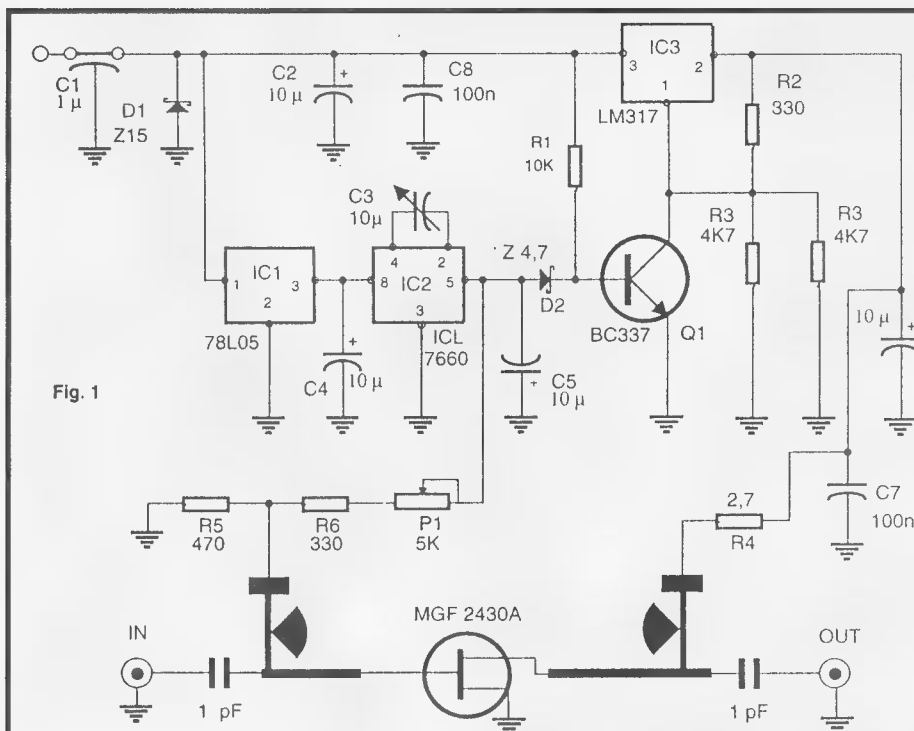
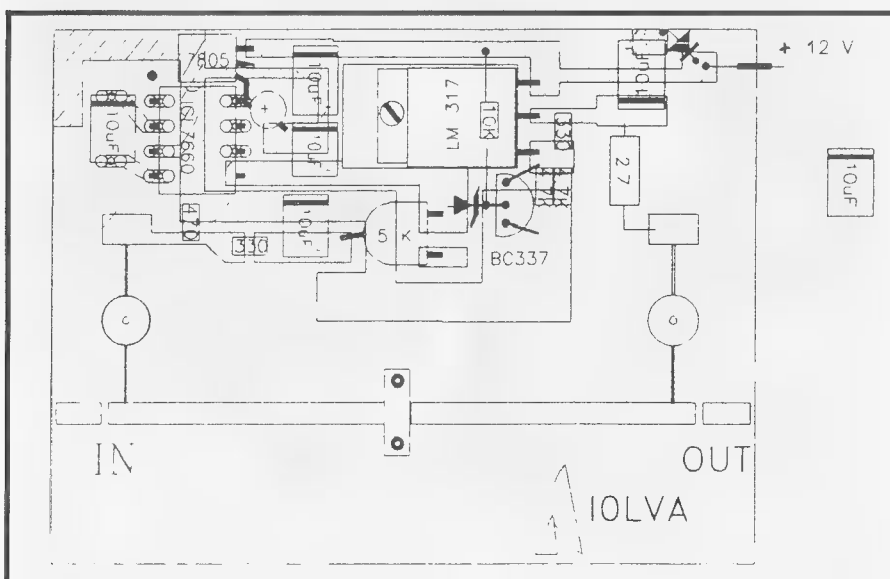
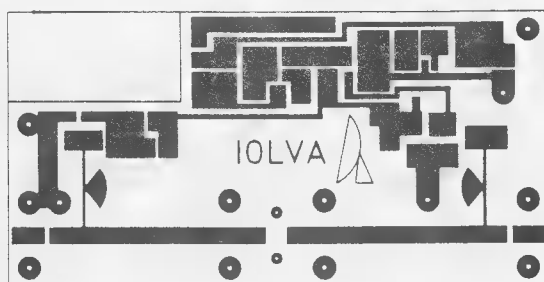
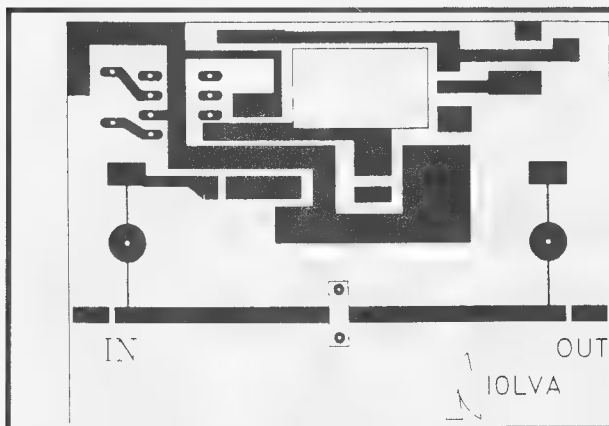


Fig. 1

List of components

1	C1	1	nF
4	C2,4,5,6	10	uF — 25 V SMD
1	C3	10	uF — 25 V SMD
1	C8	100	nF SMD
1	C7	100	nF SMD
2	C9, C10	1	pF SMD ATC
1	D1	Zener	15 V
1	D2	Zener	4.7 V
1	J1	Input	SMA
1	J2	Out	SMA
1	P1	5	kΩ
1	Q1	BC337	
1	R1	10	kΩ
2	R2, R6	330	Ω
1	R3	2,350	kΩ
		(parallel two	
		4,7 kΩ SMD)	
1	R4	2,7	Ω
1	R5	470	Ω SMD
1	Q2	MGF 2430A	
1	IC1	78L05	
1	IC2	ICL 7660	
1	IC3	LM317	



of copper or brass sheet — 5 mm, 4 mm, or 3.5 mm by 2 mm. Drive the amplifier with 100 to 200 mW and start tuning by moving the metal tags along the 50 ohm line starting at the input connector. Check the output with a power meter and adjust for maximum. Once the maximum has been obtained switch the power off and solder the tags in position. If everything has gone as it should the power meter will read about 1 Watt.

The results obtained with the two prototypes are:-

	1	2
Input	105 mW	180 mW
Output	630 mW	930 mW
I Drain	300 mA	300 mA
Gain	7.78 dB	7.13 dB

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